

Hydrogen Effects on GaAs Device Reliability

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Abstract

GaAs and InP devices in hermetically sealed packages have been observed to exhibit unacceptable degradation in both RF and DC characteristics. This degradation has been observed to occur at temperatures as low as 125° C. The source of the degradation has been linked to hydrogen gas that has been absorbed in the package's metals (Kovar, plating, etc.) and converted into atomic hydrogen within the Pt or Pd metallization of the gate structure. Subsequently, atomic hydrogen diffuses into the channel region of the FET structure and neutralizes the Si donors, resulting in a degradation of the device characteristics,

This paper will provide a description of the problem and a summary of the general understanding of the failure mechanism(s). A discussion of the observed or suspected reactions, the effects on device parameters, and the current industry efforts to find a solution to this problem will also be presented.